

AMENDMENTS TO THE CLAIMS

The listing of claims below replaces all prior versions, and listings, of claims:

- 1           1.       (Original) A method, comprising:  
2                   storing a first data structure containing costs associated with transmitting  
3 data between routers in a network;  
4                   combining the first data structure with itself to determine a cost of  
5 transmitting the data; and  
6                   transmitting the data along a route based on the calculated cost.
- 1           2.       (Original) The method of claim 1, further comprising storing a second data  
2 structure defining router connections in the network.
- 1           3.       (Original) The method of claim 2, wherein storing the second data  
2 structure comprises storing a matrix defining router connections.
- 1           4.       (Original) The method of claim 3, wherein storing the first data structure  
2 comprises storing a matrix, wherein the costs are based on at least one of a distance,  
3 reliability, security, or expense of transmitting the data between routers in the network.
- 1           5.       (Original) The method of claim 4, wherein combining the first data  
2 structure with itself calculates the cost of transmitting the data between a source router  
3 and destination router in the network for a given number of steps at minimal cost.
- 1           6.       (Currently Amended) The method of claim 5, wherein the transmitting the  
2 data along the route further comprises determining the route between the source router  
3 and the destination router based on the cost matrix and the connection matrix.
- 1           7.       (Original) The method of claim 2, further including determining the  
2 second data structure.

1           8.     (Original) The method of claim 1, wherein transmitting the data comprises  
2 transmitting an IP data packet.

1           9.     (Original) The method of claim 1, further including determining the first  
2 data structure.

1           10.    (Currently Amended) An apparatus, comprising:  
2                   an interface adapted to receive a data packet;  
3                   at least one storage device to store:  
4                         a first data structure defining router connections in a network; and  
5                         a second data structure that defines a cost associated with links  
6 between routers in the network; and  
7                   a controller adapted to:  
8                         combine the second data structure with itself at least once to  
9 determine a cost for transmitting the data packet; and  
10                         determine a route based on the first data structure and the  
11 ~~calculated~~ determined cost for transmitting the data packet.

1           11.    (Original) The apparatus of claim 10, wherein the first data structure  
2 comprises a first matrix that defines the router connections in the network wherein the  
3 router connections comprise adjacent router connections.

1           12.    (Original) The apparatus of claim 11, wherein the second data structure  
2 comprises a second matrix that defines the cost associated with each link between  
3 adjacent routers as exponents.

1           13.    (Original) The apparatus of claim 12, wherein the cost of each link  
2 between a router and itself is defined as zero and the cost for each link from a router to a  
3 non-adjacent router is defined as infinity.

1           14.    (Original) The apparatus of claim 13, wherein the controller is adapted to  
2 combine the second matrix using the formula  $\min_{1 \text{ to } k} (D_{ik} * D_{kj})$ , wherein k is the number  
3 of the routers and the second matrix is represented by D that has i rows and j columns.

1           15.    (Cancelled)

1           16.    (Original) The apparatus of claim 12, wherein the costs are based on at  
2 least one of a distance, reliability, security, or expense of transmitting the data packet  
3 between the adjacent routers in the network.

1           17.    (Currently Amended) The apparatus of claim 12, wherein the controller is  
2 further adapted to combine the second matrix with itself a ~~number~~ plurality of times until  
3 the cost of transmitting the data packet between a source router and destination router is  
4 minimum for a given number of steps.

1           18.    (Original) The apparatus of claim 10, wherein the controller is adapted to  
2 determine a direct connection between each link of the route based on the first data  
3 structure.

1           19.    (Original) The apparatus of claim 10, wherein the controller is further  
2 adapted to transmit the data packet along the route.

1           20.    (Original) The apparatus of claim 10, wherein the data packet is an IP data  
2 packet.

1           21.   (Currently Amended) An article comprising at least one machine-readable  
2 storage ~~media~~ medium containing instructions for routing a data packet, the instructions  
3 when executed causing a controller to:

4                   represent node connections in a network in a first matrix;  
5                   represent costs of transmitting the data packet ~~between each of~~ among a  
6 plurality of nodes in a second matrix, the second matrix containing elements expressed as  
7 exponents each representing distances between corresponding pairs of nodes; and  
8                   determine a route to transmit the data packet based on the first matrix and  
9 the second matrix.

1           22.   (Currently Amended) The article of claim 21, wherein the instructions  
2 when executed cause the ~~processor~~ controller to transmit the data packet over the route.

1           23.   (Currently Amended) The article of claim 21, wherein the instructions  
2 when executed cause the ~~processor~~ controller to represent adjacent node connections in  
3 the first matrix.

1           24.   (Cancelled)

1           25.   (Currently Amended) The article of claim ~~24~~ 21, wherein the instructions  
2 when executed cause the ~~processor~~ controller to represent a cost between each node and  
3 itself as zero and each node to a non-adjacent node as infinity.

1           26.   (Currently Amended) ~~The article of claim 25, wherein the instructions~~  
2 ~~when executed cause the processor to~~ An article comprising at least one machine-  
3 readable storage medium containing instructions for routing a data packet, the  
4 instructions when executed causing a controller to:

5                   represent node connections in a network in a first matrix;  
6                   represent costs of transmitting the data packet among a plurality of nodes  
7 in a second matrix;

8                   determine a route to transmit the data packet based on the first matrix and  
9 the second matrix; and

10                   combine the second matrix using the formula  $\min_{1 \text{ to } k} (D_{ik} * D_{kj})$ , wherein  
11 k is the number of the routers and the second matrix is represented by D that has i rows  
12 and j columns.

1           27.   (Cancelled)

1           28.   (Currently Amended) The article of claim 21, wherein the instructions  
2 when executed cause the ~~processor~~ controller to represent the costs ~~comprises the~~  
3 ~~processor to represent~~ including at least one of a distance, reliability, security, or expense  
4 of transmitting the data packet between each of the plurality of nodes.

1           29.   (Currently Amended) The article of claim 21, wherein the instructions  
2 when executed cause the ~~processor~~ controller to combine the second matrix with itself a  
3 ~~number~~ plurality of times until the costs of transmitting the data packet between a source  
4 node and destination node are minimum for a given number of steps.

1           30.   (Currently Amended) The article of claim 21, wherein the instructions  
2 when executed cause the ~~processor~~ controller to determine the route to transmit an IP data  
3 packet.

1           31.   (Currently Amended) A data signal embodied in a carrier wave  
2 comprising instructions for routing a data packet to at least one of a plurality of network  
3 entities, the instructions when executed causing a controller to:

4                   store a connection matrix indicating adjacent nodes in a network;  
5                   store a cost matrix expressing transmission costs as exponents; and  
6                   determine a route for transmitting the data packet based on the connection  
7 and cost matrices from a first node to a second node.

1           32.   (Currently Amended) The data signal of claim 31, wherein the instructions  
2 when executed cause the ~~processor~~ controller to transmit the packet data over the route.

1           33.   (Currently Amended) A communication system, comprising:  
2                   a source entity adapted to transmit a data packet;  
3                   a router capable of receiving the data packet, the router adapted to:  
4                         define a cost matrix containing transmission costs associated with  
5 routing the data packet between ~~a pair~~ pairs of routers in a network;  
6                         determine a transmission cost of transmitting the data packet ~~data~~  
7 to a destination entity ~~based on~~ using the cost matrix to iteratively determine a minimum  
8 distance between any pair of routers in one hop up to N hops, where N is two or greater;  
9 and  
10                   transmit the data packet to the destination entity using a route  
11 associated with the transmission cost.

1           34.   (Original) The communications system of claim 33, wherein the data  
2 packet is an IP data packet.

1           35.     (New) The communication system of claim 33, wherein the router is  
2 adapted to iteratively determine the minimum distance between any pair of routers in one  
3 hop up to N hops by:

4                     combining the cost matrix with itself to produce a resultant matrix that  
5 represents the minimum distance between any pair of routers in one hop; and

6                     combining the resultant matrix with the cost matrix to produce a second  
7 resultant matrix that represents the minimum distance between any pair of routers in two  
8 or fewer hops.

1           36.     (New) The method of claim 1, wherein combining the first data structure  
2 with itself produces a resultant data structure that contains elements each representing a  
3 distance between a corresponding pair of routers in one hop, the method further  
4 comprising:

5                     combining the resultant data structure with the first data structure to  
6 produce a second resultant data structure that contains elements each representing a  
7 distance between a corresponding pair of routers in two or fewer hops.

1           37.     (New) The method of claim 36, further comprising:

2                     combining the second resultant data structure with the first data structure  
3 to produce a third resultant data structure that contains elements each representing a  
4 distance between a corresponding pair of routers in three or fewer hops.

1           38.     (New) The apparatus of claim 10, wherein the controller is adapted to  
2 produce, based on combining the second data structure with itself, a resultant data  
3 structure  $D^1$  containing elements each representing a distance between a corresponding  
4 pair of routers in one hop, the controller adapted to further produce resultant data  
5 structures  $D^m$ , where m is two and greater, based on combining the resultant data  
6 structure  $D^{m-1}$  with the second data structure, where  $D^m$  contains elements that represent  
7 distances between corresponding pairs of routers in m or fewer hops.

1           39.   (New) The apparatus of claim 38, wherein the controller is adapted to  
2   iteratively increment  $m$  until the controller has identified a resultant data structure  $D^m$  that  
3   contains elements that represent minimum distances between corresponding pairs of  
4   routers.

1           40.   (New) The article of claim 21, wherein the instructions when executed  
2   cause the controller to:  
3                combine the second matrix with itself to produce a first resultant matrix  $D^1$   
4   that contains elements representing distances between corresponding pairs of routers in  
5   one hop; and  
6                produce additional resultant matrices  $D^m$ ,  $m$  being two and greater, by  
7   combining the resultant matrix  $D^{m-1}$  with the second matrix, each resultant matrix  $D^m$   
8   containing elements representing distances between corresponding pairs of routers in  $m$   
9   or fewer hops.